African Invertebrates Vol. 44 (1) Pages 71–87 Pietermaritzburg August, 2003

A new genus of Penicillata from Southern Africa with pseudoarticulated sensilla on the palpi of the gnathochilarium (Diplopoda: Polyxenida: Polyxenidae)

by

Monique Nguyen Duy-Jacquemin

(Muséum National d'Histoire Naturelle, Departément Systématique & Evolution,
Zoologie-Arthropodes, 61 rue de Buffon, F-75231 Paris cedex 05, France;
monguyen@mnhn.fr)

ABSTRACT

Three genera of Penicillata, belonging to the family Polyxenidae, appear to show the sensilla on their gnathochilarial palps apically pseudoarticulated. These are *Macroxenus* Brölemann, 1917 (the type-species: *Polyxenus rubromarginatus* Lucas, 1846, from Algeria), *Macroxenodes* Silvestri, 1948 (the type-species: *Polyxenus meinerti* Silvestri, 1898, from Venezuela), and *Chilexenus* Silvestri, 1948 (the type-species: *Polyxenus rosendinus* Silvestri, 1903, from Chile). A new genus of this group, *Afraustraloxenodes*, is erected for three new species: *namibiensis* (the type-species), from Namibia; *coineaui*, from Namibia and Angola; and *hulleyi*, from South Africa. A fourth member, *Monographis schultzei* Attems, 1909, from South Africa, formerly placed in *Chilexenus*, is now also added to *Afraustraloxenodes*, based upon a re-examination of a syntype of *C. rosendinus* showing, as in *Macroxenus*, a spine on tarsus II, which was not mentioned by Silvestri (1948). The new genus *Afraustraloxenodes* resembles *Macroxenodes* in lacking tarsal spines, but it differs in the number, shape and arrangement of the antennal sensilla. All four Southern African species belonging to this new genus differ from each other chiefly in their antennal sensilla and in their labral ornamentation.

INTRODUCTION

During several scientific expeditions to Namibia, Prof. Y. Coineau collected two new species of Penicillata showing pseudoarticulated sensilla on the palps of the gnathochilarium. This character is shared by three genera belonging to the family Polyxenidae: *Macroxenus* Brölemann, 1917 (the type-species: *Polyxenus rubromarginatus* Lucas, 1846, from Algeria), *Macroxenodes* Silvestri, 1948 (the type-species: *Polyxenus meinerti* Silvestri, 1898, from Venezuela), and *Chilexenus* Silvestri, 1948 (the type-species: *Polyxenus rosendinus* Silvestri, 1903, from Chile). Amongst these genera, *Macroxenus* and *Macroxenodes* are better known while *Chilexenus*, erected at the same time as *Macroxenodes* by Silvestri (1948) in his key to the genera of Penicillata, can be considered to be poorly known.

As a recent re-examination of a syntype of *rosendinus* shows, tarsi II of *Chilexenus*, just as in *Macroxenus*, support one spine each. In contrast, both species from Namibia as well as a new species from South Africa, as in the species of *Macroxenodes*, have a seta, not a spine, on each tarsus II. However, these Southern African penicillates do not belong to any of the above three genera. Instead, this trio appears to be related to yet another species long known from South Africa, *Monographis schultzei* Attems, 1909, redescribed by Nguyen Duy-Jacquemin & Condé (1967) based on type material from Prince Albert, and, provisionally, assigned to *Chilexenus*. All four Southern African species actually require the erection of a new genus.

MATERIAL AND METHODS

Most of the material treated here belongs to the collection of the Muséum National d'Histoire Naturelle, Paris (MNHN), two syntypes are in the South African Museum, Cape Town (SAMC), while two paratypes have been donated to the collection of the National Museum of Namibia, Windhoek (SMWN).

Measurements were taken separately for the body and penicil.

TAXONOMY

Family Polyxenidae Lucas, 1840

Afraustraloxenodes gen. n.

Type species: *Afraustraloxenodes namibiensis* sp. n.

Etymology: *Afraustral* refers to the southern (austral) African distribution pattern of this genus; *xenodes* means inhabitant, chosen by analogy to the related genus *Macroxenodes*.

Generic Diagnosis: Distinguished by the following combination of character states:

Trichomes: short and thick.

Head: Eight ocelli on each side. Vertex with one pair of posterior tufts not separated from the anterior tufts and consisting of two rows (anterior and posterior); last trichome of posterior row slightly more posterior than the trichobothria. Distance between each tuft of vertex short. Three or more short, thick sensilla basiconica on antennal article VI, and two on article VII. One setiform and one coeloconicum sensilla on articles VI and VII. Three trichobothria of equal size with cylindrical funiculi (Fig. 3). Entire surface of labrum with numerous and varied papillae and armed with lamellate teeth at anterior margin. Outer palp of gnathochilarium with sensilla pseudoarticulated apically. Middle palp with sensilla pseudoarticulated apically, except for seven short antero-median sensilla (Figs 8, 26, 28).

Trunk: Two lateral tufts of trichomes on each tergite connected by a posterior row of trichomes arranged along posterior margin of tergite. Tergites II to VIII or IX with three rows of trichomes: an anterior row (a.r.) with trichomes directed anteriad; a median (m.r.) and a posterior (p.r.) row with trichomes directed caudad. Median row often sinuous; anterior row convex towards head with first and last trichomes often at same level as median row (Figs 18, 19).

Legs: Setae on coxae, trochanters and prefemora with subcylindrical, elongate and naked funiculi. Other small, thick but pointed setae present on all prefemora, femora, tibiae and tarsi II. Pretarsus bearing anterior process with spinous projection slightly shorter than claw and posterior lamellate process longer than claw, latter projection thickened and pleated basally. Claw with two strongly pointed latero-anterior and posterior teeth, subequal in length.

Telson: Two latero-dorsal penicils of crooked trichomes joined side by side. Dorsal face of telson with a few barbate trichomes (*a*), two subcircular groups composed of barbate trichomes (*c*), and one barbate antero-internal trichome (*b*) (Fig. 17). Ventral face with a subrectilinear row of barbate trichomes located at edge of penicil of crooked trichomes, usually with three to four crooks (Figs 20, 43, 48).

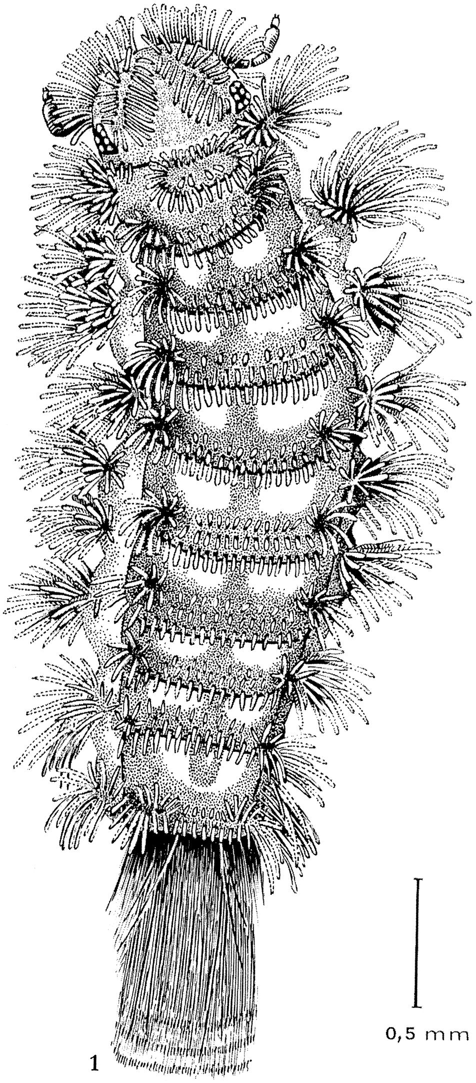


Fig. 1. *Afraustraloxenodes namibiensis* sp. n., paratype. Adult female, habitus, dorsal view.

Generic grouping: *Macroxenus* Brölemann, 1917; *Chilexenus* Silvestri, 1948; *Macroxenodes* Silvestri, 1948; *Afraustraloxenodes* gen. n.

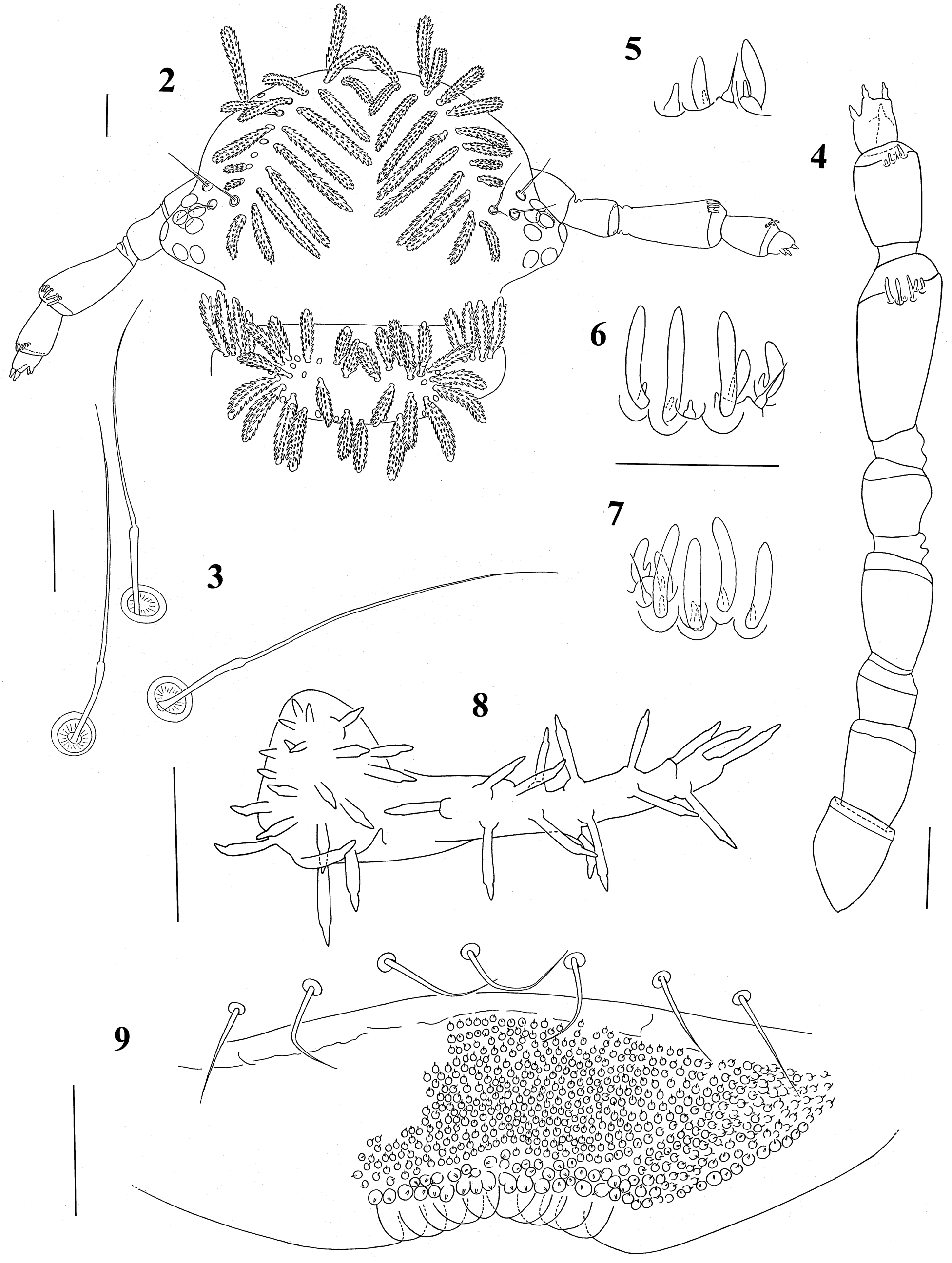
Distribution: Southern Africa.

Afraustraloxenodes namibiensis sp. n.

(Figs 1–20)

Etymology: The name refers to the terra typica.

Type material: Holotype adult male, allotype adult female; paratypes: seven adult males, one adult female and one subadult male (with 12 pairs of legs) (MNHN), one adult



Figs 2–9. *Afraustraloxenodes namibiensis* sp. n. 2–3. Adult male no. 5. 2. Head and collum, dorsal view. 3. Structural details of right trichobothria. 4–6. Allotype, adult female. 4. Left antenna. 5–6. Sensilla of articles VII and VI of the same antenna. 7. Adult male from near Windhoek, sensilla of right antennal article VI. 8. Adult male no. 2, left palp of gnathochilarium. 9. Male holotype, labrum, papillae only represented on median and left parts. Scale bars: Figs 2, 4, 9 = 50 µm; other figures = 25 µm.

male (SMWN), NAMIBIA: towards Rehoboth, on C26 road, 2.5 km before C26-1265 crossroads, under stones, alt. 1760 m, on ledge of rocks, 28.x.1991, Y. Coineau.

Other material examined: One adult male (MNHN), NAMIBIA: 150 km West of Windhoek, near cross towards south, on rocks, 26.iii.1981, Y. Coineau.

Description of adults:

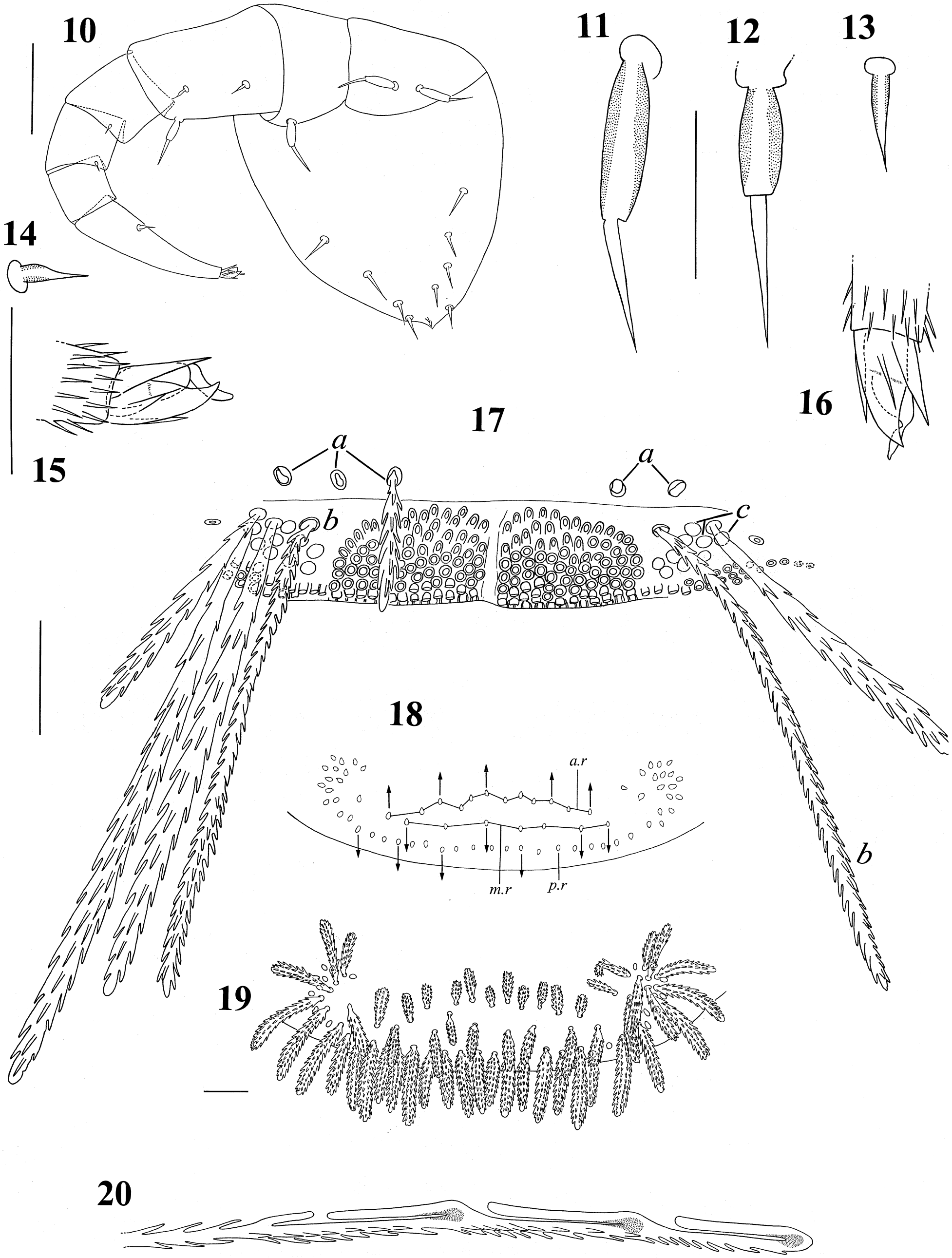
Coloration: Brownish with darker greyish-brown trichomes, pigmentation indicated in Fig. 1.

Measurements: Body length (without caudal penicil): holotype 2.70 mm; allotype 3.00 mm; paratypes 2.80 mm (except male no. 5 in extension, 3.30mm). Length of caudal penicil: 0.50 mm. Length of tarsus II of 13th leg, 98 (holotype) to 102 µm.

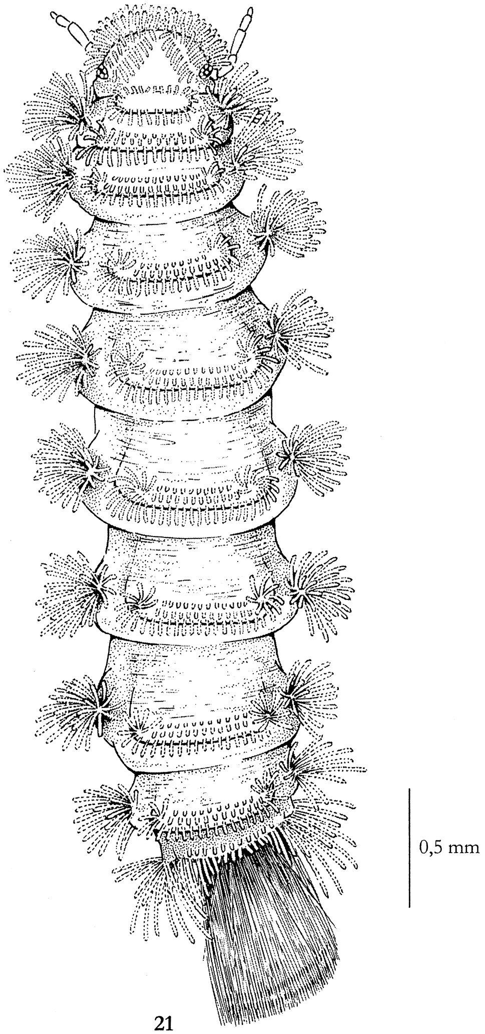
Head: Eight ocelli on each side. Vertex with one pair of posterior tufts consisting of two rows: anterior row with nine (except eight in a male and 10 in a female), posterior row with seven to nine trichomes, last trichome slightly more posterior to trichobothria (Fig. 2). Distance between each tuft small. Proportions of antennal articles as in Fig. 4; ratio length/diameter of article VI = 1.50–1.90. Antennal article VI with five dorsal sensilla basiconica: anterior two short and slightly more apical than longer posterior three (Fig. 6); one sensillum coeloconicum between first and last two posterior sensilla basiconica; one setiform sensillum between the two short anterior sensilla. Right antenna of one male with only four sensilla basiconica (one long sensilla missing). Antennal article VII with two dorsal sensilla basiconica: posterior one shorter than anterior; one sensillum coeloconicum posterior and one setiform sensillum between two sensilla basiconica (Fig. 5). Three trichobothria of equal size, with cylindrical funiculi (Fig. 3). Surface of labrum with numerous, small, short-cuspidate papillae; papillae of anterior two or three rows larger (Fig. 9). 5+5 lamellate teeth at anterior margin. Clypeo-labrum with nine to 10 setae along posterior margin. Outer palp of gnathochilarium with 15 or 16 sensilla pseudoarticulated apically; middle palp with 21 sensilla, comprising 14 long pseudoarticulated sensilla and seven short non-articulated at apex (Fig. 8).

Trunk: Except on tergites VIII or IX to X, trichomes arranged in three rows and two lateral tufts (Figs 18, 19). Each paired tuft connected by a posterior row of trichomes (p.r.) arranged along posterior margin of tergite; two more anterior rows (a.r. and m.r.) with a few trichomes spaced apart. In posterior row, shorter trichomes alternating with longer trichomes. Total number of trichomes on tergites as follows: I (collum), 40–47; II to VII, 54–81. Lateral protuberance of tergite I with three or four trichomes in a row (Fig. 2).

Legs: Each article of legs bearing sensory setae, except first tarsus. Coxa, trochanter and prefemur each bearing a seta with an oval base furnished with acute process at apex (Figs 11, 12). Chaetotaxy as follows: coxa I with one seta, coxae II to XIII with two setae, except VIII and IX in male (one seta and three small setae at edge of opening of coxal glands); trochanters with one seta; prefemora with one seta and one or two (one three) small aligned setae (Figs 10, 13); each femur and tibia with same small seta as prefemur, tapered apically. Second tarsus with a small seta as shown in Fig. 14. Pretarsus bearing anterior process with a spinous projection slightly shorter than claw, two subequal latero-anterior and posterior spiniform processes; posterior lamellate process thickened and pleated basally (Figs 15, 16).



Figs 10–20. *Afraustraloxenodes namibiensis* sp. n.10–16. Male holotype. 10. Right leg II and penis. 11–12. Coxal and prefemoral setae of the same leg. 13. Small seta on the same prefemur. 14. Seta on tarsus II of right leg II. 15. Telotarsus of the same leg. 16. Telotarsus of left leg VIII. 17–20. Male no. 5. 17. Telson, dorsal view: *a*, *b* and *c*, barbate dorsal trichomes. 18. Insertions of trichomes on tergite III: *a.r.* anterior row; *m.r.* median row, *p.r.* posterior row. 19. Trichomes on tergite III. 20. Crooked trichome. Scale bars: Figs 10, 17 = 50 µm; other figures = 25 µm.



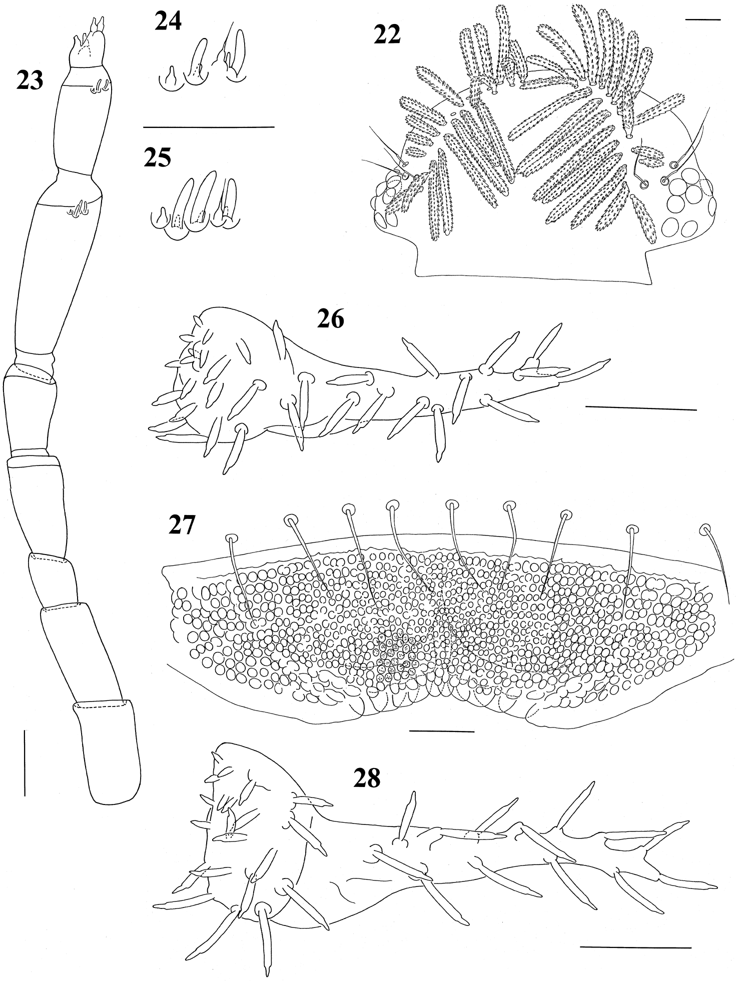
21

Fig. 21. *Afraustraloxenodes coineaui* sp. n., paratype. Adult male in extention, habitus, dorsal view.

Male: All areas of penis with thin, usual, cuticular setae and nine or 10 small setae (Fig. 10). Coxal glands on legs VIII and IX.

Telson. Four to five setae above anal valve, two external ones with raised base. Bundle of caudal penicil unseparated. On each side of median plate, dorsal trichomes of telson consisting of two or three trichomes (*a*), one trichome (*b*) inner to group of 10–11 trichomes (*c*) (10 in male no. 5, Fig. 17). Trichomes of caudal penicil generally with three hooks (Fig. 20), rarely with two or four.

Remarks: The male collected 150 km west of Windhoek differs from the type specimens from around Rehoboth by the complete absence of pigment, by its small size (2.35 mm) and in having six sensilla basiconica on antennal article VI (three long sensilla and



Figs 22–28. *Afraustraloxenodes coineaui* sp. n. 22. Adult female from Angola, head, dorsal view. 23–26. Holotype, adult female. 23. Left antenna. 24–25. Sensilla of articles VII and VI of the same antenna. 26. Left palp of gnathochilarium. 27–28. Adult female from Mirabib. 27. Labrum, interior granules only represented in a few papillae. 28. Left palp of gnathochilarium. Scale bars: Figs 24, 25, 27 = 25 µm; other figures = 50 µm.

three short sensilla in the left antenna: Fig. 7; four long sensilla and two short sensilla in the right antenna).

Afraustraloxenodes coineaui sp. n.

(Figs 21–40)

Etymology: This species is named for its collector, Prof. Yves Coineau.

Type material: Holotype adult female; paratypes: two adult females, one adult male, one female with 10 pairs of legs (MNHN), one adult female (SMWN), NAMIBIA: Hamilton Range, on top of marble mountain, in cracks of rocks, under stones, 24.x.1991;

two adult females (MNHN), same place, 9.xi.1991; one female with 12 pairs of legs (MNHN), same place, 9.xii.1993; one adult male (MNHN), same place, 14.xii.1993; two adult males, one adult female and one male with 12 pairs of legs (MNHN), same place, 12.iii.1981, all Y. Coineau. Of the specimens mounted on slides, the holotype, two female paratypes (nos 1 and 2) and one male (no. 3) (almost moulting) have been described.

Other material examined: one adult male (MNHN), NAMIBIA: Swartbank, 40 km North-West of Gobabeb, 13.iii.1991?, M. Seely; one adult female (MNHN), NAMIBIA: Mirabib Rock, 26.x.[year?], Y. Coineau; one adult female and one male with 12 pairs of legs (Coll. Prof. Condé, Nancy), ANGOLA,1962.

Description of adults:

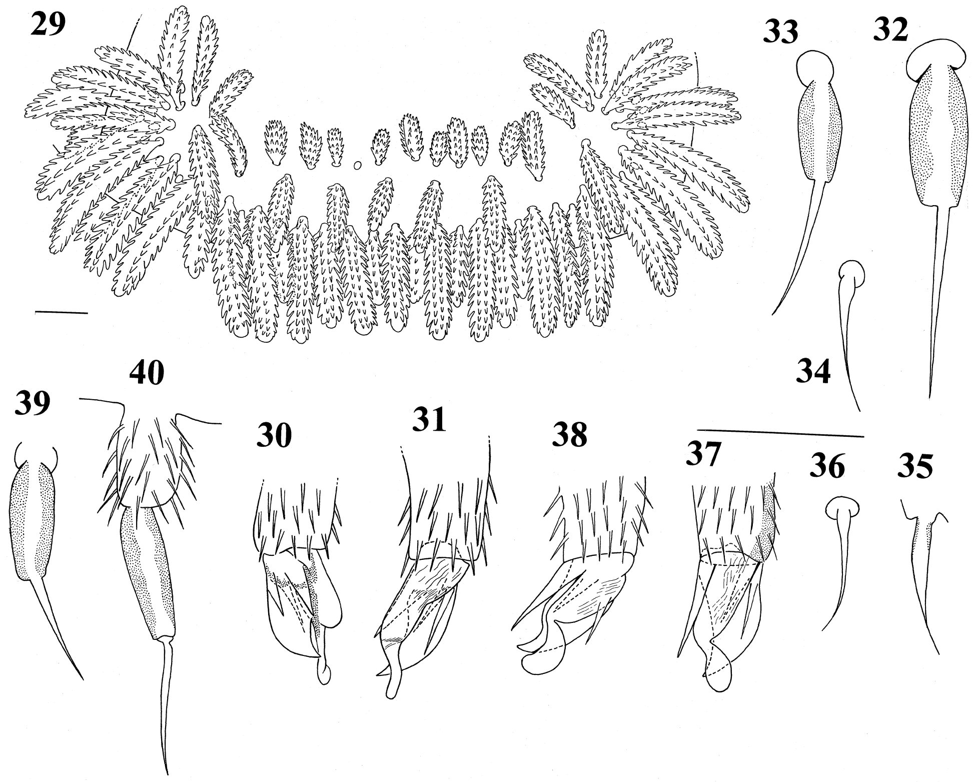
Coloration: Females from Angola and Mirabib Rock brownish with brown trichomes. All individuals from Hamilton Range (Fig. 21) and from Swartbank whitish with white or beige trichomes, some specimens showing slight pigmentation between ocelli.

Measurements: Body length (without caudal penicil): holotype 3.60 mm; females nos 2 and 3 4.10 mm; male 3.0 mm; female from Angola 2.80 mm. Length of caudal penicil: 0.90 mm in female no. 3. Length of tarsus II of 13th leg: 130 µm. (holotype and female no 2), 135 µm (female no. 3 and female from Angola), 100 µm (male).

Head: Eight ocelli on each side. Vertex with one pair of posterior tufts consisting of two rows: anterior row with nine to 11, posterior row with nine to 13 trichomes, the posteriormost being slightly behind trichobothria. Towards middle of vertex, two anterior rows not separated from anterior tufts of vertex. Distance between each tuft small (Fig. 22). Proportions of antennal articles as in Fig. 23. Article VI twice as long as diameter, with three thick dorsal sensilla basiconica: anterior slightly shorter than two subequal posterior ones (Fig. 25). One setiform sensillum between anterior sensilla, and a posterior sensillum basiconicum. One posterior sensillum coeloconicum. Antennal article VII with two dorsal sensilla basiconica: posterior one slightly shorter than anterior; one posterior sensillum coeloconicum and one setiform sensillum between two sensilla basiconica (Fig. 24). Three trichobothria of equal size, each with cylindrical funiculum. Surface of labrum with numerous flat papillae enclosing small granules (Fig. 27); two or three anterior rows of papillae larger. 5+5 lamellate teeth at anterior margin, except male with 4+4. Clypeo-labrum with eight to 10 setae along posterior margin. Outer palp of gnathochilarium with 12 or 13 pseudoarticulated sensilla apically, middle palp with 20 or 21 sensilla, comprising 13 or 14 long pseudoarticulated sensilla and seven short non-articulated sensilla (Figs 26, 28).

Trunk: Except on tergites VIII or IX to X, trichomes arranged in three rows and two lateral tufts. Each paired tuft connected by posterior row of trichomes running along posterior margin of tergite; both more anterior rows with a few trichomes spaced apart. In posterior row shorter trichomes alternating with longer trichomes (Fig. 29). Total number of trichomes on tergites as follows: I (collum), 56 to 71; II to VIII, 72 to 127. Lateral protuberance of tergite I with three to five trichomes in a row.

Legs: Each article of legs bearing sensory setae, except first tarsus. Coxa, trochanter and prefemur each bearing a seta with an oval base furnished with acute process at apex (Figs 32, 33). Chaetotaxy as follows: coxa I with one seta, II to XIII with two setae



Figs 29–40. *Afraustraloxenodes coineaui* sp. n. 29–31. Adult female from Mirabib. 29. Trichomes of tergite III. 30. Telotarsus of right leg III, antero-internal view. 31. Telotarsus of right leg II, posterior view. 32–40. Holotype, adult female. 32–33. Setae on coxa leg III and prefemur leg IV. 34–36. Small setae on femur of leg III, on tarsus II of leg XII, and on tibia of leg III. 37–38. Right telotarsi of leg III and leg IV, posterior view. 39–40. Internal and external setae above left anal valve. Scale bars: Fig. 29 = 50 µm; other figures = 25 µm.

except VIII and IX in male (one seta and two or three small setae at edge of opening of coxal glands); trochanter, femur and tibia with one seta (Figs 34, 36); prefemur with one oval-based seta plus, on II to XIII, one or two (three in two cases) small aligned setae. Coxa, femur and tibia XIII without setae in male. Second tarsus with a small seta (Fig. 35). Pretarsus bearing anterior process with a spinal projection slightly shorter than claw, two subequal latero-anterior and posterior spiniform processes, and a posterior lamellate process thickened and pleated at base (Figs 30, 31, 37, 38).

Male: All areas of penis with cuticular setae and a dozen small setae. Coxal glands on legs VIII and IX.

Telson: Four to five setae above anal valve (Figs 39, 40) of which two external ones with a raised base (Fig. 40), two in male, both also with elevated base. Dorsal trichomes of telson consisting of five to eight (females) and two to three (males) trichomes (*a*) varying on different sides (5+4 in holotype), one trichome (*b*) antero-internal of each group of 6 to 9 trichomes (*c*). Trichomes of caudal penicil generally with three or four hooks (rarely two or five).

Remarks: A different coloration is observed in specimens from Hamilton Range and Swartbank on the one hand, and Mirabib Rock and Angola on the other hand. The original locality of the specimen from Angola is unknown. The other specimens are from the Namib Desert found at three localities: (1) Hamilton Range where the white *A. coineaui* occured under rock on the top of a white marble mountain, (2) Swartbank, 40 km North-West of Gobabeb, on limestone and laterite where the individuals are white too, and (3) more easterly, granitic Mirabib Rock where the female collected is brownish with brown trichomes.

Transpiration measurements were carried out using a female of *A. coineaui* from Hamilton Range by Dr Vannier (*pers. comm.*) with a thermostatic incubator and a programmed regulator allowing air temperature to elevate from 20 °C to 90 °C, at a rate of 0.5 °C/min., in dried air. The female weighed 1.37 mg and its thermotorpor point was 59.6 °C. In comparison the thermotorpor point of some females of *P. lagurus* (bisexual form) from the Paris region varied from 55.2 °C to 55.7 °C. These preliminary investigations show that *A. coineaui* seems highly resistant to heat and dryness.

Afraustraloxenodes hulleyi sp. n.

(Figs 41–54)

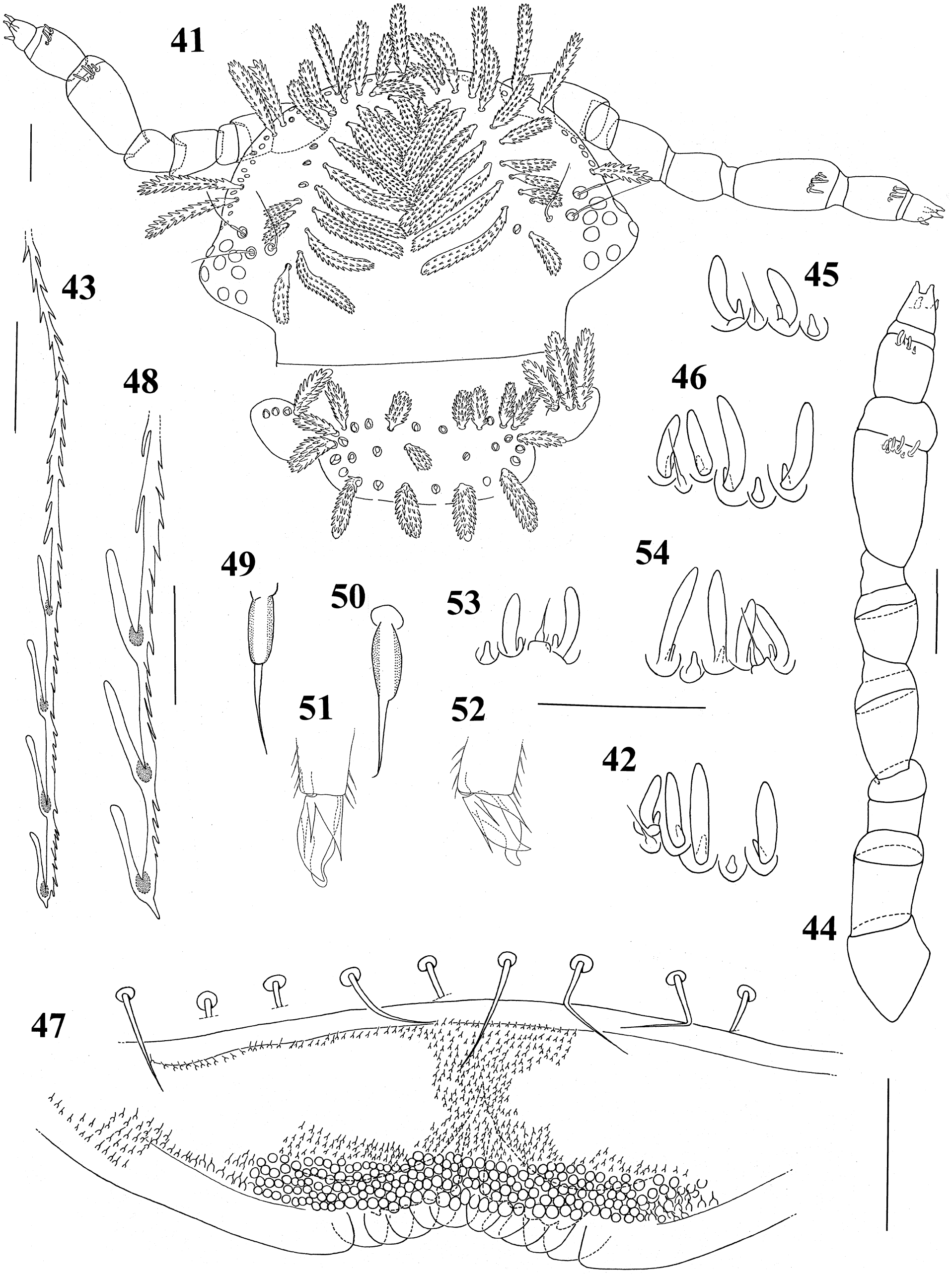
Etymology: This species is named for its collector, P. Hulley. This name was proposed by B. Condé in his correspondence with Lawrence (1966).

Type material: Holotype adult male and paratype adult female (MNHN), SOUTH AFRICA: Cape Province, Port Alfred, ix.1958, P. Hulley, no. 7231. Other paratypes: one adult male, one female with 12 pairs of legs, one individual with 6 pairs of legs (MNHN), SOUTH AFRICA: Cape Province, Kowie River Mouth, Port Alfred, near Grahamstown, 5.v.1958, P. Hulley, R. F. Lawrence.

Description of adults:

Measurements: Body length (without caudal penicil): 1.85 mm (holotype) to 2.60 mm; length of caudal penicil: 0.40 mm. Tarsus II of 13th leg: 88 (holotype) to 96 µm long.

Head: Eight ocelli on each side. Vertex with one pair of posterior tufts (Fig. 41) consisting of two rows: anterior row with seven to 12; posterior row with seven to 11 trichomes, posteriormost trichome slightly behind trichobothria. Distance between each tuft small. Proportions of antennal articles as in Fig. 44; ratio length/diameter of article VI = 1.45 to 1.60. Antennal article VI with four dorsal sensilla basiconica: anterior two short and slightly more apical than longer posterior two (Figs 42, 46, 54); one sensillum coeloconicum between two posterior sensilla basiconica; one setiform sensillum between two short anterior sensilla. Antennal article VII with two dorsal sensilla basiconica: posterior one shorter than anterior; one posterior sensillum coeloconicum and one setiform sensillum between two sensilla basiconica (Figs 45, 53). Three trichobothria of equal size, each with a cylindrical funiculum. Entire surface of labrum with numerous small, cuspidate papillae (also called cuticular setae) in addition to four to five anterior rows of spherical papillae (Fig. 47). 5+5 lamellate teeth at anterior margin. Clypeo-labrum with nine to 12 setae along posterior margin. In female, outer palp of gnathochilarium with 10 pseudoarticulated sensilla apically; middle palp with



Figs 41–54. *Afraustraloxenodes hulleyi* sp. n. 41–43. Paratype, adult male; 41. Head and collum, dorsal view. 42. Sensilla of articles VI of left antenna. 43. Distal part of crooked trichomes. 44–52. Holotype female. 44. Right antenna. 45–46. Sensilla of articles VII and VI of the same antenna. 47. Labrum, only part of cuticular setae shown. 48. Distal part of crooked trichome. 49. Seta on prefemur of right leg I. 50. Seta on coxa of left leg III. 51–52. Right telotarsi IV and VI, anterior view. 53–54. Adult male from Kowie River mouth, sensilla of articles VII and VI of left antenna. Scale bars: Figs 41, 43, 44 = 50 µm; other figures = 25 µm.

21 sensilla, comprising 14 long pseudoarticulated sensilla and seven short non-articulated sensilla.

Trunk: Except on tergites VIII or IX to X, trichomes arranged in three rows and two lateral tufts. Each lateral tuft connected with three rows of trichomes: posterior row running along posterior margin of tergite; two more anterior rows with a few trichomes spaced apart. Total number of trichomes of each tuft on tergites as follows: tergite I 29 to 38; tergites II to VII 45 to 87. Lateral protuberance of tergite I with three or four trichomes (Fig. 41).

Legs: Coxa, trochanter and prefemur each bearing a seta with oval base furnished with acute process apically. Chaetotaxy as follows: coxa I with one seta, II to XII generally with two setae (Fig. 50); trochanter with one seta; only some femora with a small seta each; prefemur with one large seta (Fig. 49) and one or two small aligned setae. Second tarsus with a small seta. Pretarsus similar to that of *namibiensis* and *coineaui*; anterior process of pretarsus with a spinous projection slightly shorter than claw, two subequal latero-anterior and posterior spiniform processes, and a posterior lamellate process (Figs 51, 52).

Male: All areas of penis with cuticular setae. Coxal glands on legs VII, VIII and IX.

Telson: Four setae above anal valve, two external ones with raised base. Bundle of caudal penicil unseparated. On each side, dorsal trichomes consisting of two or three trichomes (*a*) (three in holotype), one trichome (*b*), seven to 10 trichomes (*c*) (eight in holotype). Trichomes of caudal penicil generally with three (Fig. 48), sometimes four (Fig. 43), hooks.

Female with 12 pairs of legs (subadult):

Measurements: Body length (without caudal penicil): 2 mm. Length of tarsus II of 12th leg: 88 µm.

Posterior tufts of vertex with anterior row of eight and nine trichomes, posterior row of eight and seven trichomes, variation depending on body side. External structure of labrum as in adults with three to four anterior rows of spherical papillae. 6+5 lamellate teeth at anterior margin. Clypeo-labrum with 10 setae along posterior margin. Outer palp of gnathochilarium with 10 sensilla. Antennal characters identical to those of adults. Ventral caudal transitory tufts (present in larvae only) with about 20 trichomes.

Larva with six pairs of legs:

Measurements: Body length (without caudal penicil): 1.50 mm. Length of tarsus II of 6th leg: 80 µm.

Head: Posterior tufts with anterior row of eight and nine trichomes, posterior row of five and six trichomes. Antennal sensilla identical to those of adults.

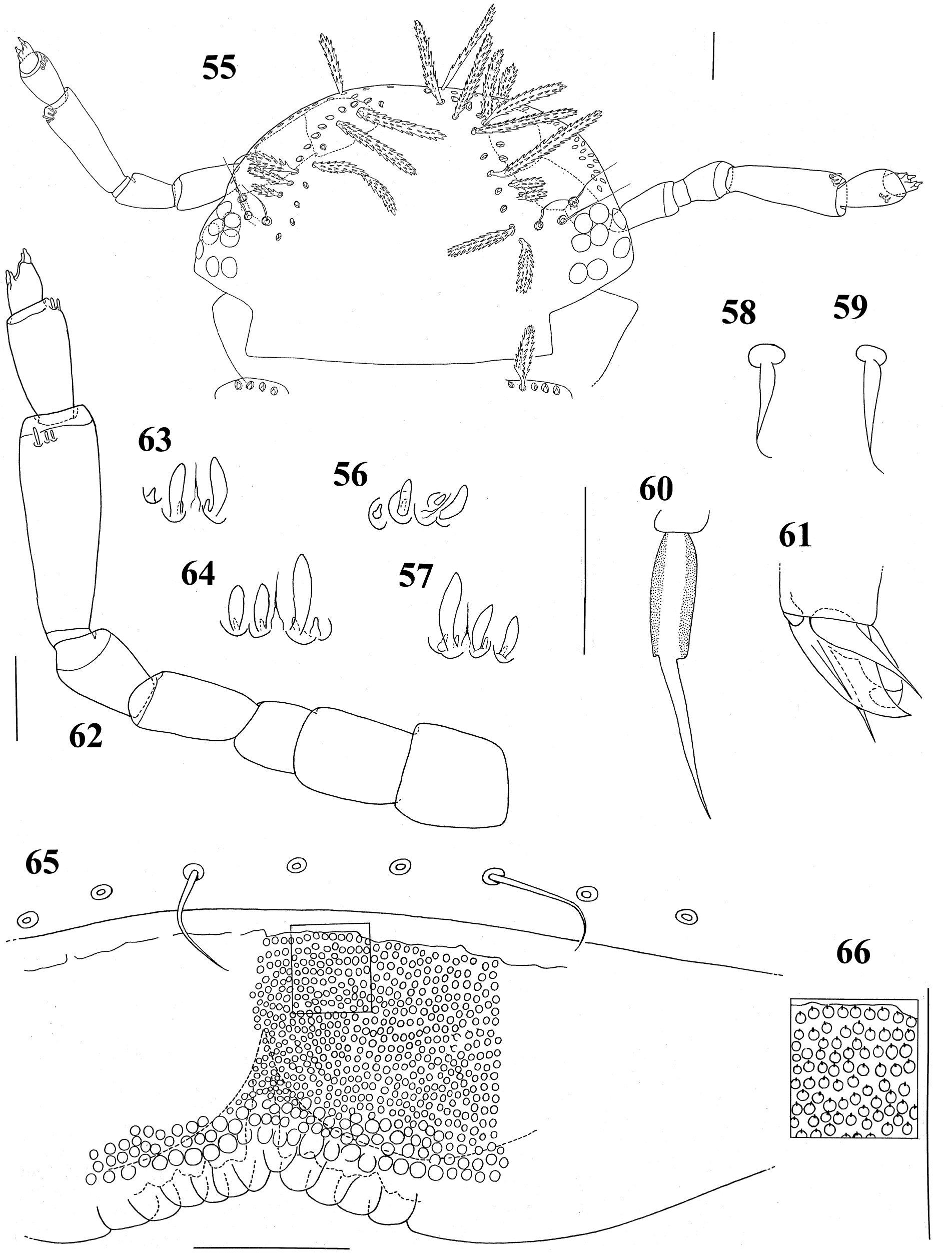
Telson: Two and three trichomes (*a*). Transitory tufts with a dozen trichomes.

Remarks: Three pairs of coxal glands are rarely observed in Polyxenidae. Usually they only show two pairs.

Afraustraloxenodes schultzei (Attems, 1909), **comb. n.**

(Figs 55–66)

Material examined: Two adult females (SAMC), SOUTH AFRICA: Cape Province, Prince Albert, under stones, no. 1640, pres[ented] W.F. Purcell, March 1896.



Figures 55–66. *Afraustraloxenodes schultzei* (Attems, 1909). 55–61. Adult female no. 2. 55. Head, dorsal view. 56–57. Sensilla of articles VII (view from above) and VI of left antenna. 58–60. Tibial, femoral and prefemoral setae of right leg II. 61. Telotarsus of right leg VIII, antero-internal view. 62–66. Adult female no.1. 62. Right antenna. 63–64. Sensilla of articles VII and VI of the same antenna. 65. Labrum, only some papillae shown. 66. Structural details of papillae shown in Fig. 65. Scale bars: Figs 55, 62 = 50 µm; other figures = 25 µm.

This material, identified as *Monographis schultzei* Attems, 1909 by Attems (1928), was redescribed by Nguyen Duy-Jacquemin & Condé (1967), with the species transferred to the genus *Chilexenus*. As a recent re-examination of a cotype (syntype) of *Chilexenus rosendinus* shows (Nguyen Duy-Jacquemin, in prep.), as in *Macroxenus*, a spine is present on tarsus II (not mentioned by Silvestri, 1948). Since *schultzei* shows a seta on tarsus II, and the trichomes are shorter than those in *rosendinus*, it is to be transferred to *Afraustraloxenodes*. A more complete description of *schultzei* than that given in 1967 is provided here, together with figures.

Redescription of adult females (nos 1 and 2):

Measurements: Body length (without caudal penicil): 3.50 mm; length of caudal penicil: 0.60 mm. Length of tarsus II of 13th leg: 107 and 117 µm.

Head: Eight ocelli on each side. Vertex with one pair of posterior tufts consisting of two rows: anterior row with 10 to 11, posterior row with eight to 10 trichomes, the last trichome being slightly more posterior than the trichobothria (Fig. 55). Distance between each tuft small. Proportions of antennal articles as in Fig. 62. Article VI more than twice as long as diameter. Antennal article VI with thick dorsal sensilla basiconica: two short anterior and one longer posterior (Figs 57, 64); one posterior sensillum coeloconicum; one setiform sensillum between the second short anterior and the posterior sensilla. Antennal article VII with two subequal dorsal sensilla basiconica separated by one setiform sensillum (Figs 56, 63). Three trichobothria of equal size, each with a cylindrical funiculum. Entire surface of labrum with numerous, small, apiculate papillae (Fig. 66), except two to three anterior rows of larger spherical papillae; anterior row largest. Five and six lamellate teeth at anterior margin in female no. 1 (Fig. 65). Clypeo-labrum with 10 or 11 setae along posterior margin. Outer palp of gnathochilarium with 12 sensilla pseudoarticulated apically, middle palp with 20 sensilla, comprising 14 long pseudoarticulated sensilla and seven short non-articulated sensilla.

Trunk: On tergites, arrangement of trichomes similar to that of above described species. Total number of trichomes of each tuft on tergites as follows: collum 62 (female no. 2); tergites II to VIII 90 to 115. Lateral protuberance of tergite I with four and five trichomes in female no. 2 (Fig. 55).

Legs: Each article of legs bearing sensory setae, except first tarsus. Coxa, trochanter and prefemur each bearing a seta with oval base furnished with acute process at apex (Fig. 60). Chaetotaxy as follows: coxa I with two setae; trochanter and prefemur with one seta each; femur and tibia each with one small seta (Figs 58, 59); second tarsus with a small seta. Pretarsus similar to that of *namibiensis* and *coineaui*, anterior process with a spinous projection slightly shorter than claw, two subequal latero-anterior and posterior spiniform processes, and a posterior lamellate process (Fig. 61).

Telson: Five setae above anal valve in female no. 1, two external ones with a raised base. Bundle of caudal penicil unseparated. On each side, dorsal trichomes of telson consisting of three and four trichomes (*a*) in one female, six and seven in the other, one trichome (*b*), 11 trichomes (*c*). Trichomes of caudal penicil generally with three, sometimes two, hooks.

DISCUSSION

Comparison between the species of *Afraustraloxenodes*

Afraustraloxenodes namibiensis sp. n., *A. coineaui* sp. n., *A. hulleyi* sp. n., and *A. schultzei* (Attems, 1909) differ chiefly in the structure of their antennal sensilla and labrum. On antennal article VI, the number of sensilla basiconica is five in *A. hulleyi*, four in *A. namibiensis*, and three both in *A. coineaui* and *A. schultzei*. In *A. coineaui*, however, the diameter of the sensilla is constant up to the attenuated apex, while the anterior sensillum is slightly shorter than the others. On the other hand, in *A. schultzei* the sensilla are slightly dilated in their median part and both anterior sensilla are shorter than the posterior one. Moreover, the setiform sensillum is located between the anterior and median sensilla in *A. coineaui*, but between the median and posterior ones in *A. schultzei*.

The labral ornamentation differs between the species: flat papillae enclosing small granules in *A. coineaui*; apiculate papillae in *A. schultzei*; short-cuspidate papillae in *A. namibiensis*; and small, cuspidate papillae in *A. hulleyi*.

The males of *A. hulleyi* show three pairs of coxal glands, having a pair of openings on coxae VII that is absent both in *A. namibiensis* and *A. coineaui* (males unknown in *schultzei*). The pseudoarticulated sensilla on the outer palps of the gnathochilarium are more numerous (15 or 16) in *A. namibiensis* than in congeners.

Affinities between the four genera with pseudoarticulated sensilla

In addition to their labial pseudoarticulated sensilla, the genera *Macroxenus*, *Chilexenus*, *Macroxenodes*, and *Afraustraloxenodes* show the same arrangement of trichomes forming the caudal penicil (type II telson, according to Condé 1969): two latero-dorsal penicils of crooked trichomes joined side by side; a subcircular group of barbate trichomes bordered by the postero-dorsal edge of each penicil. In this group, one antero-internal trichome (*b*) is thinner and lighter than the other barbate trichomes (*c*).

Differences between the genera

- *Afraustraloxenodes* and *Macroxenodes* differ from *Macroxenus* and *Chilexenus* in having a seta on tarsus II of each leg instead of a spine, and by the shorter and thicker trichomes.
- *Afraustraloxenodes* and *Macroxenodes* differ mainly in the number, shape and arrangement of the antennal sensilla of article VI. All sensilla basiconica are thick in *Afraustraloxenodes*, being arranged in a single row of no more than six. Except in *Macroxenodes poecilus* (Chamberlin, 1923), *Macroxenodes* species show more numerous sensilla basiconica (up to 16) arranged in two rows or in two groups, consisting of two types, i.e. thick and thin, long sensilla. Antennal setiform sensilla of articles VI and VII ending in two or three spines; small femoral and tibial setae ending in three or four spines in *Macroxenodes*.
- In *Afraustraloxenodes*, the arrangement of trichomes forming the anterior and median rows on tergites differs from that of *Macroxenodes*. There is a lower number of trichomes (*a*) on the telson in *Afraustraloxenodes* (two to five) than in *Macroxenodes* (up to 18). The insertion area of barbate trichomes (c+b) is subcircular in *Afraustraloxenodes*, but more extended in *Macroxenodes*.
- The anterior pretarsal process with a spinous projection is shorter than the claw in *Afraustraloxenodes*, whereas it is longer in *Macroxenodes*.

ACKNOWLEDGEMENTS

I thank Prof. B. Condé, Zoological Museum of Nancy, both for information and the loan of material, Prof. Y. Coineau (MNHN) for the Penicillata he collected in Namibia, as well as Dr E. Tremblay, Instituto di Entomologia Agraria, Fondation 'Filippo Silvestri', Portici, Italy and Dr J. R. Grindley (SAMC) for loan of certain type material under their care. Thanks also go to Dr Y. Vannier for his experimental work on one of the new species concerned. I am grateful to Dr M. Judson (MNHN) and Dr S. I. Golovatch, Moscow, who kindly corrected the English of the manuscript. I also wish to express my sincere thanks to Mrs M. Bertoncini for skillfully inking the drawings, to Mr J. Rebière for drawing the habitus of *Afraustraloxenodes namibiensis* and *A. coineaui*, and to Mr L. Albenga for arranging the figures on the computer.

REFERENCES

ATTEMS, C. 1909. Myriopoda. *In*: Schultze, L., ed., *Forschungsreise im westlichen und zentralen Südafrika ausgeführt in den Jahren 1903-1905* **14**: 1–52

———. 1928. The Myriapoda of South Africa. *Annals of the South African Museum* **26**: 1–431.

BRÖLEMANN, H. W. 1917. *Macroxenus*, nouveau genre de Myriapodes Psélaphognathes. *Bulletin de la Société d'Histoire naturelle de l'Afrique du Nord* **8** (6):114–118.

CONDÉ, B. 1969. Essai sur l'évolution des Diplopodes Pénicillates. *Bulletin du Muséum National d'Histoire Naturelle*, 2e Série **41**, supplément no. 2: 48–52.

LAWRENCE, R. F. 1966. The Myriapoda of the Kruger National Park. *Zoologica Africana* **2** (2): 225–262.

——— 1983. *The centipedes and millipedes of Southern Africa. A guide*. Cape Town: A. A. Balkema.

LUCAS, H. 1846. Note sur quelques nouvelles espèces d'insectes qui habitent les possessions françaises du Nord de l'Afrique-Myriapodes. *Revue Zoologique par la Société Cuvierenne*: 283–284.

NGUYEN DUY–JACQUEMIN, M. & CONDÉ, B. 1967. Morphologie et géonémie du genre *Monographis* Attems. *Mitteilungen aus dem Zoologischen Museum in Hamburg* **64** : 43–81.

SILVESTRI, F. 1898. Diagnósticos de nuevos Diplopodos sudamericanos. *Anales del Museo National de Buenos Aires* **6**: 53–79.

——— 1903. Note diplopodologiche. IV. Pselaphognata dell'America meridionale. *Bollettino dei Musei di Zoologia ed Anatomia Comparata della Universita di Torino* **18** (433) : 14–21.

——— 1948. Tavola sinottica dei generi dei Diplopoda Penicillata. *Bollettino del Laboratorio di Entomologia Agraria, Portici* **8**: 214–220.